

CHAPTER V

EXPLOSIVES SAFETY FOR RESEARCH AND DEVELOPMENT (R&D) OPERATIONS

V.A REQUIREMENTS

V.A.01 Requirements for USACE MM R&D are under development. However, work shall be performed in accordance with DoD 6055-09-STD, AR 385-10, DA PAMs 385-10/61/62/64/69, 29 CFR 1910.1450, 29 CFR 1919.1200, when applicable.

V.B MINIMUM GUIDANCE REQUIREMENTS

V.B.01 Activity Hazard Analysis (AHA, Fig I.6-2) and SOP. Hazard analyses and detailed SOPs must be developed to ensure that the risks associated with these operations are minimized. That together with good laboratory practices will ensure the safety protection of people and real property from explosives and CA hazards associated with the operation or activity.

V.B.01.01 The CRM approach shall drive the safety and occupational health standards for each research and development laboratory operation.

V.B.01.02 Protective measures, equipment, and procedures should be determined through hazard analysis of each operation.

V.B.01.03 Each SOP shall be reviewed by the safety office and approved by the commander or his designated representative.

V.B.02 Storage. Explosives safety site plan (ESSP) for the storage of explosives and chemicals is on Chapter IV.

V.B.02.01 Laboratory quantities of energetic liquids (DoD 6055.09-STD, Table C9.T16) shall be stored and handled as prescribed by the controlling DoD Component. **> NOTE: The required QD are only based on the energetic liquids' energetic reaction (blast**

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overpressure and container fragmentation). These QD requirements do not consider the toxicity or potential down-wind hazard. Therefore, QD may not be the only factor that needs to be considered when selecting a location for storage and operations of energetic liquids.

V.B.02.02 Energetic liquids known to be contaminated or in a suspect condition shall be isolated and provided separate storage from all other energetic liquids pending laboratory analysis for verification of contamination and disposition requirements, if any.

V.B.03 Labeling.

V.B.03.01 Locations where chemical agents and munitions are stored, handled, used, and processed require the use of chemical hazard symbols. These symbols shall be used by themselves or in conjunction with fire symbols, as appropriate.

V.B.03.02 Each inner container and the outer container of chemical agents and agent candidates must be labeled with its agent and/or code name to properly identify the contents.

V.B.03.03 The label will have a red border and will have dimensions of at least 4 1/2 by 5 1/2 inches, when container size permits.

V.B.03.04 As necessary, the dimensions of labels for small inner containers may be as small as approximately 1/4 of those stated above.

V.B.03.05 Those inner containers too small for complete information, as above, must have name or code name of agent clearly marked and may refer to remainder of information by locally determined system.

V.B.03.06 The color of inner and outer container labels, as well as information thereon, will be identical. Labels will contain the following information:

- a. **TOXIC CHEMICAL** (in bold, red, capital letters).
- b. The original issue quantity of agent in the container stated in metric terms and the concentration if diluted. This quantity should be updated, as required, when a formal inventory is conducted.
- c. The operating activity responsible for storage and the numbers of the building and room where the material is stored.
- d. The name and telephone number of the custodian of the material.
- e. The date when the material was first placed in storage.
- f. Special instructions or notes regarding use or removal of the contents.
- g. Some method of identification of the person who prepared the solution or agent quantity.

V.B.04 Monitoring.

V.B.04.01 Air monitoring stations shall be established around toxic chemical agent operational areas and storage areas to determine if DoD 6055.09-STD, Table C11.T1 AEL are exceeded. In laboratory environments this requirement is met by routine area monitors and stack sampling.

V.B.04.02 Monitoring analyses conducted for the purpose of demonstrating compliance with AEL shall be based on DoD Component-certified reference materials.

V.B.04.03 Monitoring analyses conducted for the purpose demonstrating compliance with AEL shall be conducted under quality assurance plans that address the following issues:

- a. Production, characterization, and storage of DoD Component-certified reference materials.

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b. Documentation of precision, accuracy, and quantification limits of analytical methodology.

c. External oversight of laboratory results.

V.B.05 Ventilation.

V.B.05.01 Ventilation systems will be designed so that air flow is away from the operator and toward the potential source of agent. Air pressure within the laboratory will be maintained below that of surrounding areas and entry corridor.

V.B.05.02 A scheduled preventive maintenance program should be established to provide continued assurance of adequate ventilation performance.

V.B.05.03 Ventilation exhaust will not be re-circulated or used as makeup air for areas occupied by unprotected personnel. Makeup air diffusers will not be located so as to cause turbulence at the laboratory hood face.

V.B.05.04 Where ventilation is a sole or prime method of personnel protection, backup emergency power (automatic start generator) or other fail-safe systems should be installed to prevent exposure in the event of an unplanned power outage.

V.B.05.05 Ventilation hoods or glove boxes used for overnight storage of agent should not be used for any agent operation except transfers from storage and related dilutions unless only 100 ml or less of a single category of agent (for example, nerve agents versus vesicant agents) is stored therein, or unless agent is stored in a vault or refrigerator. Charged agent generators may be used in the same hood in which they are stored if no other agent is stored in that hood, or if another agent is stored in a vault or refrigerator.

V.B.06 Personnel practices.

V.B.06.01 All agents will be stored in a restricted laboratory, locked hood, or other facility to which access can be positively controlled.

V.B.06.02 Prior to assignment to such work, personnel who work with agents will be trained in the use and handling of toxic agents; in the donning, wearing, and doffing of protective clothing; in the use of decontaminating materials; and in procedures to be followed in the event of a spill or exposure.

V.B.06.03 When conducting agent activities, only personnel necessary to the operation will be permitted in the laboratory work area. However, a minimum of two qualified persons will be present.

V.B.06.04 Procedures will be established to ensure that the installation firefighting personnel and the security force are aware, and will be notified, of the presence and type of agent and room in which it is located in order to adequately respond to emergency situations.

V.B.06.05 The storage or consumption of food or beverages; the storage or application of cosmetics; the smoking or storage of smoking materials, tobacco products or other products for chewing; or the chewing of such product in all laboratory agent areas, is prohibited. Laboratory glassware will not be used to prepare or consume food or beverages.

V.B.06.06 Agent first-aid kits will be maintained in each laboratory operating or storage room.

V.B.07 Decontamination.

V.B.07.01 A supply of decontaminating material appropriate and adequate for the type and quantity of agent present and equipment for its use, if required, will be immediately available in the laboratory.

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V.B.07.02 Each toxic chemical laboratory will develop and implement a chemical laboratory hygiene plan in accordance with 29 CFR 1910.1450, if applicable. This plan will be reviewed and concurred in by the lab safety manager and industrial hygienist.

V.B.08 Material safety data sheets (MSDSs). All laboratories will keep an inventory of hazardous chemicals and material safety data sheets on hazardous chemicals within the laboratory; the supervisor will ensure laboratory personnel are trained in accordance with section 1200, part 1919, title 29, Code of Federal Regulations (29 CFR 1919.1200) (Hazardous Communication Standard).

V.B.09 Disposal. The installation environmental coordinator should be consulted prior to disposal of hazardous chemicals.

V.B.10 Shipment. Ship chemical agents and research development test and evaluation (RDTE) solutions in accordance with DOT requirements for hazardous materials, title 49, Code of Federal Regulations (49 CFR). For RDTE solutions, consideration must be given to the chemical agents and the solvent present when determining the proper shipping name.